

Essentials of Oceanography, 11e (Trujillo)
Chapter 2 Plate Tectonics and the Ocean Floor

Match the term with the appropriate phrase. You may use each answer once, more than once or not at all.

- A) Gondwanaland
- B) paleomagnetism
- C) rift valley
- D) paleogeology
- E) Laurasia
- F) subduction zone
- G) Pangaea
- H) Panthalassia

1) ancient precursor of the Pacific Ocean

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

2) supercontinent 250 million years ago

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

3) depression along a ridge axis

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

4) study of magnetism over geologic time

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

5) sloping area from a trench along a downward moving plate

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

Answers: 1) H 2) G 3) C 4) B 5) F

Match the term with the appropriate phrase. You may use each answer once, more than once or not at all.

- A) transform fault
- B) spreading center
- C) subduction zone

6) island arc

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

7) mid-ocean ridge

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

8) seafloor magnetic stripes

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

9) seafloor spreading

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

10) trench

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

Answers: 6) C 7) B 8) B 9) B 10) C

11) The relatively young age of the seafloor supports the idea that subduction must take place.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

12) The magnetic north pole has remained very close to the geographic North Pole throughout all of geologic time.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

13) Paleomagnetism confirms that at particular times in the geologic past Earth has had more than one magnetic north pole.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

14) New crust is formed at trenches and older crust is subducted at oceanic ridges.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

15) The oldest rocks are located at mid-ocean ridges.

Answer: FALSE

Diff: 3

Skill: Application

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

16) The magnetic field of the Earth reverses itself each time that magma erupts at a mid-ocean ridge.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

17) Fast-moving spreading zones tend to be more gently sloping than slow-moving ridges.

Answer: TRUE

Diff: 3

Skill: Application

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

18) Deep-sea trenches are found at convergent plate boundaries.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

19) At divergent plate boundaries, usually only shallow depth earthquakes can be found.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

20) Water depth decreases as you move away from the mid-ocean ridge.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

21) A rift valley may be associated with divergent plate boundaries.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

22) Convergent plate boundaries occur when tectonic plates move in opposite directions.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

23) Iceland is geologically active because it is located along the mid-Atlantic ridge.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

24) Areas of intense volcanic activity that remain in more or less the same location over long periods of geologic time and are unrelated to plate boundaries are called hotspots.

Answer: TRUE

Diff: 1

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

25) Mantle plumes are columnar areas of hot molten rock that arise from within the lithosphere.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

26) The majority of the world's hotspots are associated with plate boundaries.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

27) The origin of many seamounts and tablemounts is related to volcanic activity occurring at hotspots.

Answer: TRUE

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

28) Charles Darwin was the first person to propose a hypothesis on the origin of coral reefs.

Answer: TRUE

Diff: 1

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

29) The three stages in the geologic development of coral reefs are fringing, barrier, and patch.

Answer: FALSE

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

30) The Wilson Cycle uses plate tectonic processes to show the life cycles of ocean basins during their growth, formation, and destruction over geologic time.

Answer: TRUE

Diff: 1

Skill: Comprehension

Section: 2.6 How Can Plate Tectonics Be Used as a Working Model?

Essent'l Concept: 2.6 Discuss how plate tectonics is used as a working model to help explain features and processes on Earth

31) The first person to advance the idea of mobile continents or continental drift was:

A) Harry Hess.

B) Frederick Vine.

C) Alfred Wegener.

D) Drummond Matthews.

E) John Tuzo Wilson.

Answer: C

Diff: 1

Skill: Knowledge

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

32) Evidence for continental drift includes:

A) the fit of the continents.

B) matching sequences of rocks and mountain chains.

C) past glacial activity.

D) the distribution of organisms.

E) all of the above.

Answer: E

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

33) Fossil remains of organisms on land and in sediments can be used to:

A) indicate the relative age of the sediments.

B) provide evidence for plate movement.

C) suggest ancient climate characteristics.

D) support the idea that landmasses were joined.

E) all of the above.

Answer: E

Diff: 3

Skill: Application

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

34) Fossils of ancient polar plants are currently found near the equator because the:

- A) entire earth had polar conditions at the time the plants were living.
- B) plants lived near the poles, but landmasses have drifted to current locations.
- C) plants probably were tolerant of both tropical and polar conditions.
- D) plants were distributed to current locations by ancient glacial ice sheets.
- E) poles were at the equator at times in the geologic past.

Answer: B

Diff: 3

Skill: Application

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

35) All continents fit together with the least number of overlaps and gaps when the continents are matched along:

- A) contours at around 2,000 meters depth.
- B) current shorelines.
- C) edge of the continental shelf.
- D) edges of the deep sea floor.
- E) oceanic trenches in subduction zones.

Answer: A

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

36) Climate distribution on Earth is primarily controlled by:

- A) Earth's geologic history.
- B) latitude.
- C) longitude.
- D) presence or absence of glacial debris.
- E) plants and animals that live in an area.

Answer: B

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

37) Wegener used all of the following provide evidence for continental drift *except*:

- A) age of selected continental rocks.
- B) apparent polar wandering.
- C) location of coral reef fossils.
- D) seafloor magnetic pattern.
- E) shape of continental margins.

Answer: D

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

38) The book *The History of Ocean Basins*, which contained the idea of seafloor spreading, was written by geologist:

- A) Harry Hess.
- B) Frederick Vine.
- C) Alfred Wegener.
- D) Drummond Matthews.
- E) John Tuzo Wilson.

Answer: A

Diff: 1

Skill: Knowledge

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

39) Frederick Vine and Drummond Matthews determined that new ocean floor was being produced at ocean ridges by examining:

- A) apparent polar wandering.
- B) fossils in marine sediments.
- C) glacial debris at various locations.
- D) the location of ancient coral reefs.
- E) the magnetic pattern of rocks on the seafloor.

Answer: E

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

- 40) The seafloor magnetic pattern is best described as:
- A) not related to the location of mid-ocean ridges.
 - B) parallel to and symmetric about mid-ocean ridges.
 - C) parallel to, but not symmetric about mid-ocean ridges.
 - D) perpendicular to and symmetric about mid-ocean ridges.
 - E) perpendicular to, but not symmetric about mid-ocean ridges.

Answer: B

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

- 41) Which of the following statements is **true** of the lithosphere?
- A) The lithosphere is composed of outer mantle material.
 - B) The lithosphere is composed of igneous rock.
 - C) The lithosphere is composed of metamorphic rock.
 - D) The lithosphere is composed of the crust and the uppermost portion of the mantle.
 - E) The lithosphere is composed of the inner portion of the mantle and the outer core.

Answer: D

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

- 42) Tectonic plates are pieces of the _____ that float on the more fluid _____ below.

- A) crust; lithosphere
- B) asthenosphere; lithosphere
- C) lithosphere; asthenosphere
- D) mantle; crust
- E) lithosphere; mesosphere

Answer: C

Diff: 1

Skill: Knowledge

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

- 43) Moving from an oceanic ridge to an oceanic trench, the thickness of the lithosphere:

- A) decreases in proportion to the distance.
- B) is unrelated to the distance from the ridge.
- C) increases in proportion to the distance.
- D) randomly varies.
- E) remains the same.

Answer: C

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

- 44) The Mid-Atlantic Ridge is an example of a:
- A) convergent plate boundary (continent-continent).
 - B) convergent plate boundary (continent-oceanic).
 - C) convergent plate boundary (oceanic-oceanic).
 - D) divergent plate boundary.
 - E) transform fault boundary.

Answer: D

Diff: 1

Skill: Knowledge

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

- 45) Deep ocean trenches are associated with:

- A) rift valleys.
- B) subduction zones.
- C) submarine canyons.
- D) transform faults.
- E) turbidity currents.

Answer: B

Diff: 3

Skill: Application

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

- 46) Which of the following is characteristic of oceanic-continental convergent plate boundaries?

- A) andesitic volcanoes
- B) fracture zones
- C) hot spots
- D) mid-ocean ridges
- E) volcanic island arcs

Answer: A

Diff: 1

Skill: Knowledge

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

- 47) Which of the following is characteristic of oceanic-oceanic convergent plate boundaries?

- A) fracture zones
- B) hot spots
- C) mid-ocean ridges
- D) volcanic island arcs

Answer: D

Diff: 1

Skill: Knowledge

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

48) Which of the following is characteristic of continental-continental convergent plate boundaries?

- A) hot spots
- B) uplifted mountain ranges
- C) mid-ocean ridges
- D) volcanic island arcs

Answer: B

Diff: 1

Skill: Knowledge

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

49) The San Andreas Fault:

- A) is a continental transform fault.
- B) is an oceanic transform fault.
- C) is associated with deep focus earthquakes.
- D) is located in the Juan de Fuca Plate.

Answer: A

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

50) The Hawaiian Islands are located where the Pacific plate is:

- A) being subducted beneath the North American plate.
- B) being subducted beneath Japan.
- C) being thrust over the North American plate.
- D) diving under Japan.
- E) moving over a hot spot or mantle plume.

Answer: E

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

51) Large volcanoes on the seafloor that are cone-shaped on top because they never reached sea level are called:

- A) hotspots.
- B) tablemounts.
- C) seamounts.
- D) guyots.
- E) mantle plumes.

Answer: C

Diff: 1

Skill: Knowledge

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

52) volcanoes on the seafloor that are flat-topped because of wave erosion are called:

- A) hotspots.
- B) tablemounts.
- C) seamounts.
- D) abyssal hills.
- E) mantle plumes.

Answer: B

Diff: 1

Skill: Knowledge

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

53) Coral reefs:

- A) are most common in the tropical portion of the Atlantic Ocean basin.
- B) can be found at latitudes above 60°.
- C) form when underwater volcanoes are thrust upward during a tectonic event.
- D) include atolls, barrier, and fringing reefs.
- E) were first described by Christopher Columbus during his voyage to the Caribbean Island of Hispaniola.

Answer: D

Diff: 2

Skill: Comprehension

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

54) The first scientist to propose the origin of coral reefs based upon subsidence (sinking) of volcanic islands was:

- A) Harry Hess.
- B) Charles Darwin.
- C) Alfred Wegener.
- D) Drummond Matthews.
- E) John Tuzo Wilson.

Answer: B

Diff: 1

Skill: Knowledge

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

55) Coral reefs that initially develop along the margin of an island or continent where environmental conditions are suitable are called:

- A) fringing reefs.
- B) barrier reefs.
- C) atolls.
- D) patch reefs.

Answer: A

Diff: 1

Skill: Knowledge

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

56) The study of historical changes of continental shapes and positions is called:

- A) paleomagnetism.
- B) paleoclimatology.
- C) sedimentology.
- D) paleogeography.

Answer: D

Diff: 1

Skill: Knowledge

Section: 2.5 How Has Earth Changed in the Past, and How Will It Look in the Future?

Essent'l Concept: 2.5 Demonstrate an understanding of how Earth has changed in the past and how it will look in the future

Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.

57)

- A. Alfred Wegener
- B. Harry Hess
- C. Drummond Matthews
- D. Frederick Vine
- E. Stanley Miller

Answer: E

Diff: 4

Skill: Analysis

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

58)

- A. Gondwanaland
- B. Panamerica
- C. Pangaea
- D. Panthalassia
- E. Tethys Sea

Answer: B

Diff: 4

Skill: Analysis

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift

59)

- A. ice age
- B. paleomagnetism
- C. seafloor spreading
- D. age of the ocean floor
- E. distribution of earthquakes

Answer: A

Diff: 4

Skill: Analysis

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

60)

- A. divergent plate boundary
- B. oceanic-continental convergence
- C. oceanic-oceanic convergence
- D. transform plate boundary
- E. hot spot

Answer: E

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

61)

- A. rift valley
- B. oceanic trench
- C. rifting
- D. seafloor spreading
- E. divergent plate boundary

Answer: B

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

62)

- A. hydrothermal vents
- B. island arc
- C. mountains
- D. oceanic trench
- E. volcanoes

Answer: A

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

63)

- A. convergent plate boundary
- B. volcanic arc
- C. island arc
- D. rift valley
- E. continental arc

Answer: D

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

64)

- A. transform fault
- B. San Andreas Fault
- C. oceanic transform fault
- D. Juan de Fuca Ridge
- E. Mariana Trench

Answer: E

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

65)

- A. Aleutian Islands
- B. Andes Mountains
- C. Hawaiian Islands
- D. Japan
- E. Mariana Trench

Answer: C

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries

66)

- A. Aleutian Islands
- B. Canary Islands
- C. Galapagos Islands
- D. Hawaiian Islands
- E. Iceland

Answer: A

Diff: 4

Skill: Analysis

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

67) What are the lines of evidence that Alfred Wegener used to support the idea of continental drift? Why did scientists of his day doubt that continents drifted?

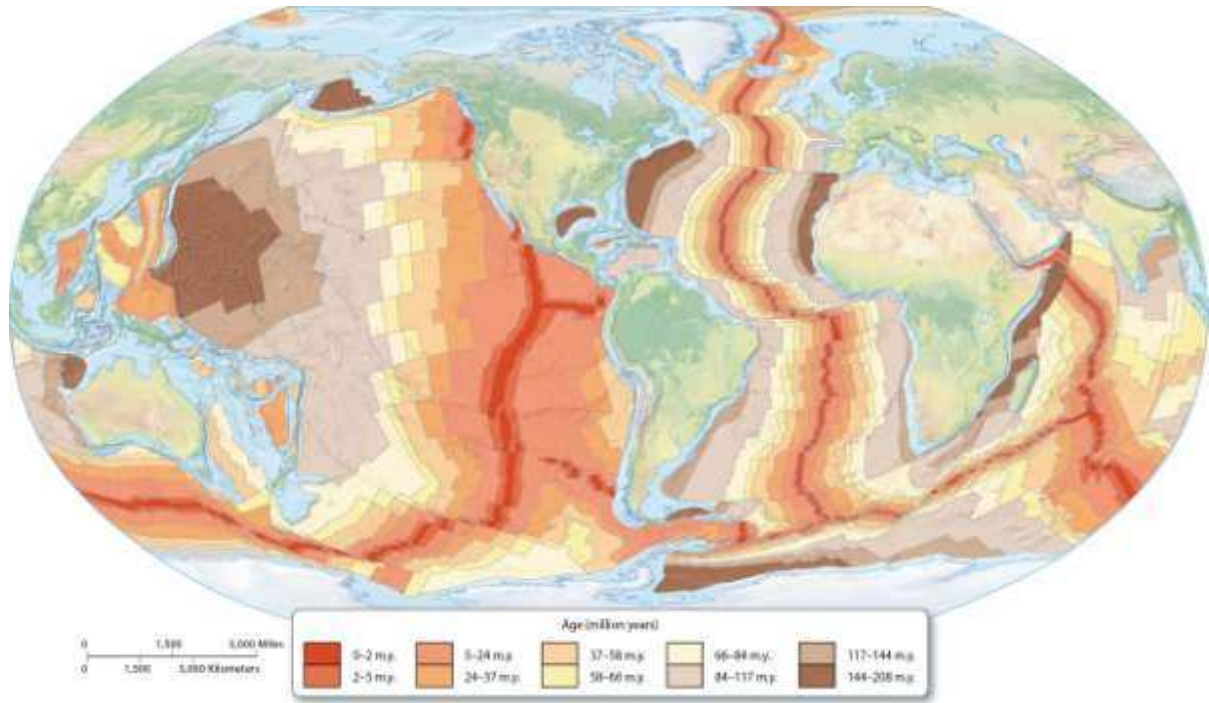
Answer: Alfred Wegener was the first scientist to advance the idea of mobile continents in 1912. Wegener proposed that the continents slowly drift across Earth's surface. Although this idea was not new, the development of better maps by the early 1900s suggested to Wegener that the shapes of matching shorelines on different continents suggested that the continents moved or drifted over geologic time. Several lines of evidence supported the idea of continental drift, namely: matching sequences of rocks and mountain chains; glacial ages and other climate evidence; and the distribution of organisms, including extant organisms and fossilized remains. The main objection from the scientific community centered on the mechanism that Wegener proposed for the movement of continents: gravitational attraction and tidal forces.

Diff: 2

Skill: Comprehension

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift



68) How is the age of the ocean sediments related to the distance from a mid-ocean ridge?

Answer: Since mid-ocean ridges are constructive plate boundaries where new crust is formed as the plates diverge, the newest crust is at the spreading center in the mid-ocean ridge (ridge axis) and as one moves away from the ridge axis toward the continent, the age of the ocean sediments increases.

Diff: 2

Skill: Comprehension

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics



(a) Distribution of earthquakes with magnitude equal to or greater than $M_w = 5.0$ for the period 1980-1990.



(b) Plate boundaries define the major tectonic plates (shaded), with arrows indicating the direction of motion and numbers representing the rate of motion in centimeters per year.

69) Why does a map of worldwide earthquakes closely match the locations of worldwide plate boundaries?

Answer: Earthquakes are sudden releases of energy usually caused by the movement of lithospheric plates or volcanic eruptions. The global distribution of earthquakes, such as the pattern shown in Figure 2.13, indicates that most occur along oceanic trenches, reflecting the energy released during the process of subduction. Other earthquakes occur along divergent plate boundaries at seafloor spreading centers along the global oceanic ridge system. Comparison of earthquake activity with the boundaries of plates indicates a high degree of correspondence.

Diff: 3

Skill: Application

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

TABLE 2.1 CHARACTERISTICS, TECTONIC PROCESSES, FEATURES, AND EXAMPLES OF PLATE BOUNDARIES

Plate boundary	Plate movement	Crust types	Sea floor created or destroyed?	Tectonic process	Sea floor feature(s)	Geographic examples
Divergent plate boundaries	Apart ← →	Oceanic-oceanic	New sea floor is created	Sea floor spreading	Mid-ocean ridge; volcanoes; young lava flows	Mid-Atlantic Ridge, East Pacific Rise
		Continental-continental	As a continent splits apart, new sea floor is created	Continental rifting	Rift valley; volcanoes; young lava flows	East Africa Rift Valleys, Red Sea, Gulf of California
Convergent plate boundaries	Together → ←	Oceanic-continental	Old sea floor is destroyed	Subduction	Trench; volcanic arc on land	Peru-Chile Trench, Andes Mountains
		Oceanic-oceanic	Old sea floor is destroyed	Subduction	Trench; volcanic arc as islands	Mariana Trench, Aleutian Islands
		Continental-continental	N/A	Collision	Tall mountains	Himalaya Mountains, Alps
Transform plate boundaries	Past each other → ←	Oceanic	N/A	Transform faulting	Fault	Mendocino Fault, Eitanin Fault (between mid-ocean ridges)
		Continental	N/A	Transform Faulting	Fault	San Andreas Fault, Alpine Fault (New Zealand)

70) How are **convergent** and **divergent** plate boundaries related to **constructive** and **destructive** plate margins?

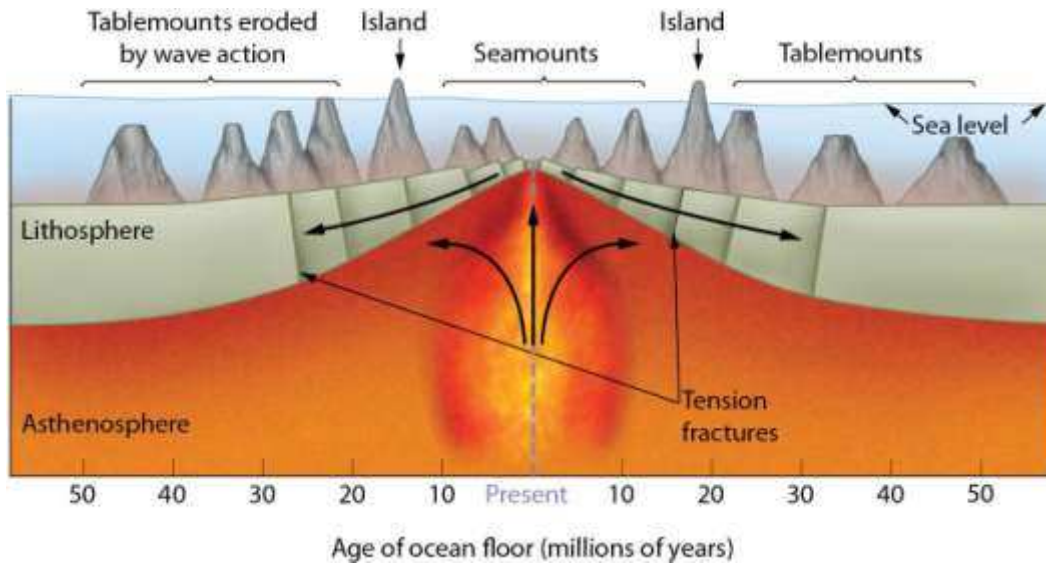
Answer: The terms convergent and divergent refer to the direction of plate movements relative to each other. Convergent plates are moving toward one another whereas divergent plate boundaries are moving in opposite directions. Constructive and destructive plate margins refer to the fate of the rock at the plate boundary. At constructive plate margins, new crust is being formed while at destructive plate boundaries crust is being destroyed (usually by melting). Convergent plate boundaries are also destructive plate boundaries because when two plates collide, one plate is forced below the other (subduction) and the subducted plate crust melts. Similarly, when two plates diverge, magma rises to the surface at rift valleys (in mid-ocean ridges) forming new crust.

Diff: 4

Skill: Analysis

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries



71) How can plate tectonics be used to help explain the differences between a seamount and a tablemount?

Answer: Tall volcanic peaks on the ocean floor resemble many volcanoes on land and can either be abyssal hills, seamounts, or tablemounts (guyots). Seamounts are cone-shaped on top, while tablemounts are flat on top. Until the theory of plate tectonics was developed, it was difficult for scientists to understand how these differences could have been produced. The origin of many seamounts and tablemounts is related to volcanic activity occurring at hotspots where mantle plumes are close to the seafloor surface. Some volcanoes may be built so high that they rise above sea level and become islands, upon which they can become flattened due to wind and wave erosion. Other volcanoes, known as seamounts, never reach the ocean surface due to plate movement over a hotspot and thus remain pointed.

Diff: 4

Skill: Analysis

Section: 2.4 Testing the Model: What Are Some Applications of Plate Tectonics?

Essent'l Concept: 2.4 Summarize some of the applications of plate tectonics

72) Briefly discuss four important lines of evidence that support the theory of continental drift.

Diff: 1

Skill: Knowledge

Section: 2.1 What Evidence Supports Continental Drift?

Essent'l Concept: 2.1 Describe the evidence that supports continental drift



(a) Distribution of earthquakes with magnitude equal to or greater than $M_w = 5.0$ for the period 1980-1990.



(b) Plate boundaries define the major tectonic plates (shaded), with arrows indicating the direction of motion and numbers representing the rate of motion in centimeters per year.

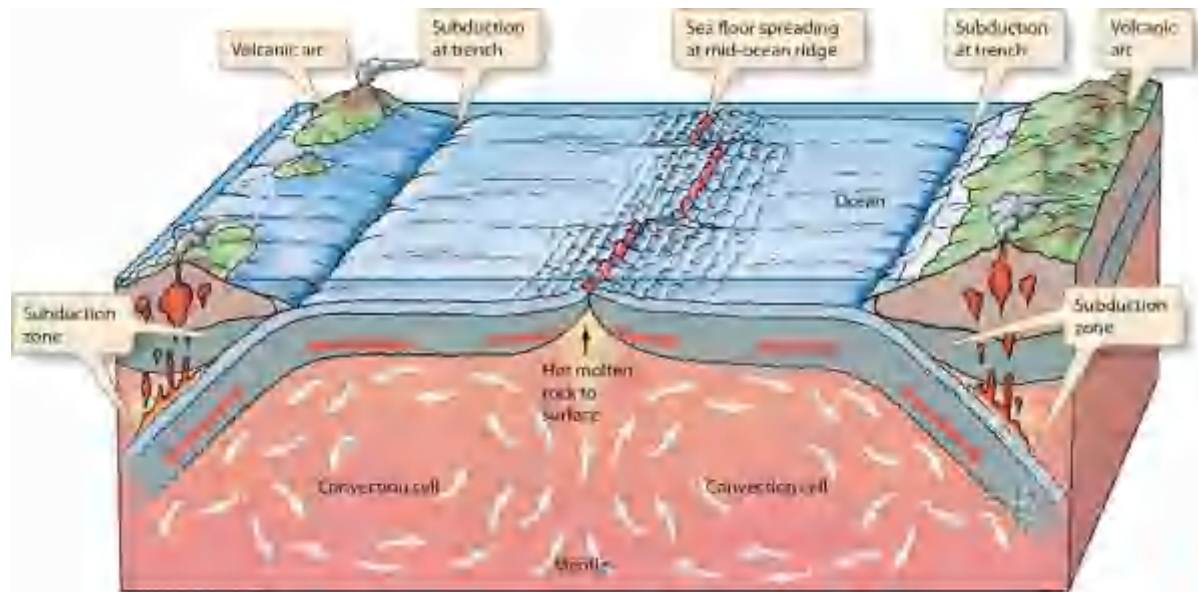
73) How has seismic activity been used in our understanding of plate boundaries?

Diff: 4

Skill: Analysis

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics



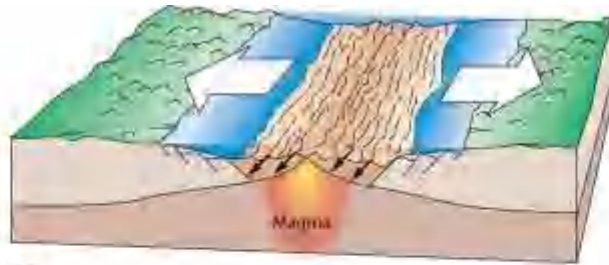
74) How does convection in the asthenosphere explain ocean basin features, heat flow, and the thickness of the lithosphere?

Diff: 3

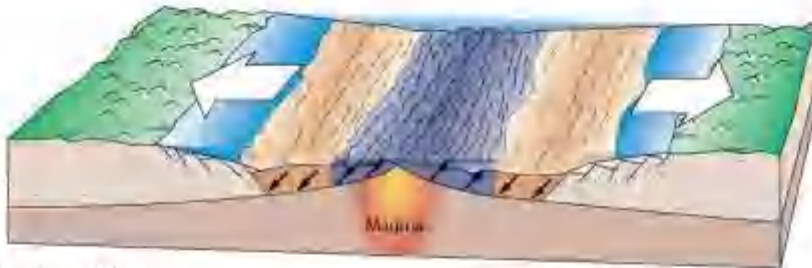
Skill: Application

Section: 2.2 What Evidence Supports Plate Tectonics?

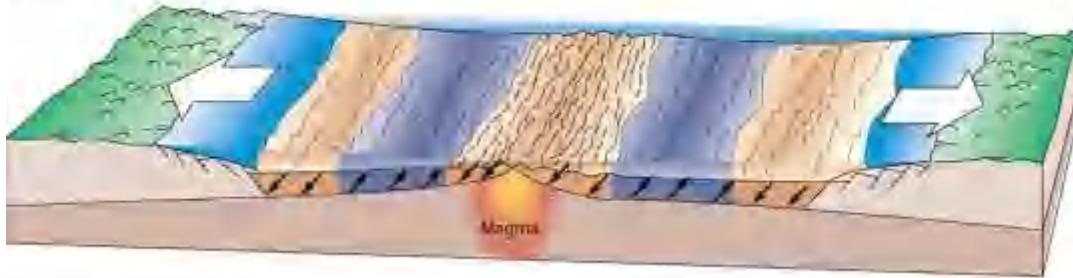
Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics



(a) Period of normal magnetism



(b) Period of reverse magnetism



(c) Period of normal magnetism

75) Describe the formation of the magnetic patterns in rocks on the seafloor.

Diff: 1

Skill: Knowledge

Section: 2.2 What Evidence Supports Plate Tectonics?

Essent'l Concept: 2.2 Describe the evidence that supports plate tectonics

76) Discuss changes in the lithosphere that occur between an oceanic ridge and an oceanic trench.

Diff: 2

Skill: Comprehension

Section: 2.3 What Features Occur at Plate Boundaries?

Essent'l Concept: 2.3 Discuss the ocean and land features that occur at plate boundaries